

MULTIMEDIA



UNIVERSITY

STUDENT ID NO

--	--	--	--	--	--	--	--	--	--

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 3, 2017/2018

DCS5058 – OPERATING SYSTEMS
(DIT & DBIS)

1 JUNE 2018
3:00 p.m – 5:00 p.m
(2 Hours)

INSTRUCTIONS TO STUDENT

1. This question paper consists of 7 pages with 2 sections.
2. Answer ALL questions.
3. Write your answers in the answer booklet provided.

Section A: Fill in the blanks (Total: 20 Marks)

Instruction: Fill in the blanks with the terms given in the table. Write your answers in the Answer Booklet provided.

Caching	Process creation	Thrashing	Direct Access	Indexed Access
Two-state	Memory-Mapped-Files	Copy-on-Write	Paging	Suspended
Five-state	Volatility	Turnover time	System calls	First-come-first-served
Compaction	Group ID	Hold-and-wait	Tightly coupled system	Loosely coupled system
Deadlock detection	Deadlock prevention	Ability to evolve	Kernel	Microkernel

1. Main objectives of operating system are efficiency, convenience and _____.
2. _____ is a system where processors share memory and a clock.
3. _____ is copying information into faster storage system.
4. Storage system is organized in hierarchy based on speed, cost and _____.
5. When an interrupt or fault occurs, hardware switches to _____ mode.
6. _____ provide the interface between a running program and the operating system.
7. _____ is a small operating system core which contains only essential core operating systems functions.
8. In _____ process model, a process may be in either running or not running state.
9. _____ occurs when a new process is to be added to those currently being managed process.
10. One of the characteristics of a _____ process is that the process is not immediately available for execution.

Continued...

11. _____ includes actual execution time plus time spent waiting for resources.
12. With _____ scheduling, when the currently running process ceases to execute, the process that has been in the ready queue the longest is selected for running.
13. In _____ condition, a process may hold allocated resources while awaiting assignment of other resources.
14. To deal with deadlock, one of the approaches is _____ which allows the system to enter a deadlock state and then take action to recover.
15. _____ is a technique for overcoming external fragmentation.
16. _____ allows main memory to be partitioned into small equal fixed-size chunks and divide each process into the same size chunks.
17. _____ allows file I/O to be treated as routine memory access by mapping a disk block to a page in memory.
18. _____ occurs when a computer's virtual memory subsystem is in a constant state of high paging activity.
19. _____ is a subset of users who can share access to the file.
20. In _____ method, file is viewed as a numbered sequence of blocks/ records.

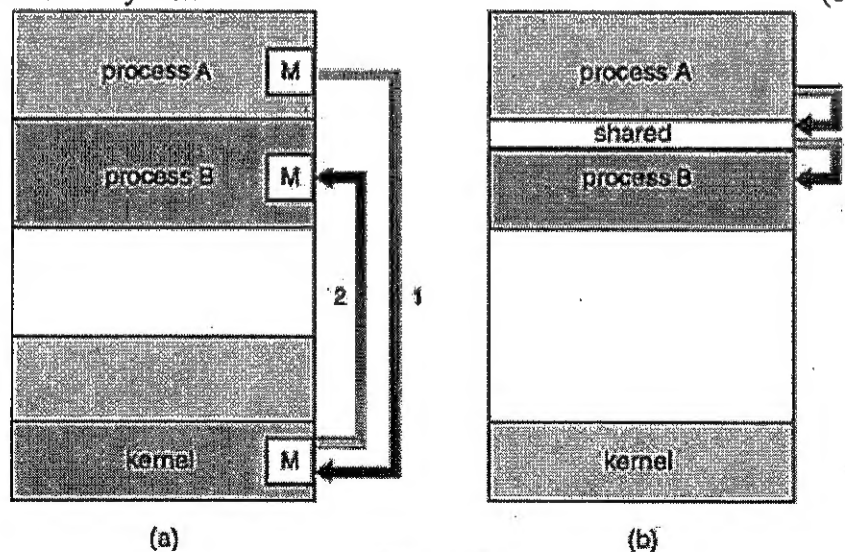
Continued...

Section B: Structured Questions, 4 Questions (Total: 80 Marks)**Instruction:** Answer *ALL* the questions in the Answer Booklet provided.**QUESTION 1 (20 Marks)**

- List and explain **TWO (2)** problems of *serial processing*. (4 Marks)
- Explain the ways interrupt is being handled in the computer systems. (4 Marks)
- Define base register and limit register. (2 Marks)
- Given the memory layout as below, determine the base registers and limit registers for Job 1 and Job 3. (4 Marks)

0	Monitor
246000	Job 1
300030	Job 2
420840	Job 3
880600	Job 4
1024500	

- Name **TWO (2)** interprocess communication model (a) and (b) in Figure 1 and explain how they work. (6 Marks)

**Figure 1****Continued...**

QUESTION 2 (20 Marks)

- a. While the program is executing, the process can be uniquely characterised by a number of elements.”
List and explain any **FOUR (4)** elements of a process. (4 Marks)
- b. Table 1 shows the processes with the length of the CPU burst time given in milliseconds. The processes arrived according to the arrival time.

Process	Arrival Time (ms)	Burst Time (ms)	Priority
P ₀	4	11	3
P ₁	3	7	2
P ₂	5	12	3
P ₃	4	9	1
P ₄	0	6	2

Table 1

Draw Gantt Charts illustrating the execution of these processors using the following scheduling algorithms. Calculate the *waiting time* for each process and the *average waiting time*.

- i. Non-preemptive Priority (6 Marks)
- ii. Round Robin (Quantum = 6) (10 Marks)

QUESTION 3 (20 Marks)

- a. Consider a system with **four** processes P₀, P₁, P₂ and P₃ and **three** resource types: Scanner (13 instances), Disk Drive (9 instances), Tape Drive (12 instances).

	Scanner		Disk Drive		Tape Drive	
	Max	Allocation	Max	Allocation	Max	Allocation
P ₀	10	1	6	0	8	2
P ₁	8	4	7	2	8	0
P ₂	9	3	4	0	1	1
P ₃	6	0	5	1	2	1

Table 2**Continued...**

Available		
Scanner	Disk Drive	Tape Drive
5	6	8

Table 3

- Based on the requirements, current allocations and available resources are given in Table 2 and Table 3. Determine the content of the matrix *Need*. (2 Marks)
 - If P_1 requests for additional instances (1, 0, 0), can this request be granted? Justify your answer. (*update relevant tables: allocation resources, remaining needs and available resources*). (8 Marks)
- Describe fixed-size partitioning in main memory and its weakness. (3 Marks)
 - Differentiate between logical address and physical address. (2 Marks)
 - Given a heap of memory management scheme with the following free list:

U	H	H	H	U	U	H	U	H	H	U	H
0K	45k	80K	110K	140K	190K	240K	300K	315K	389K	410K	590K. 600K

* U - Used

* H - Hole

The following process request will be received in order as in Table 4:

Process Number	Size in Kilobytes
1	25
2	35
3	6
4	19
5	11

Table 4

Show how the memory requests above are allocated using the following memory allocation schemes.

- Best Fit (BF) (2.5 Marks)
- Worst Fit (WF) (2.5 Marks)

Continued...

QUESTION 4 (20 Marks)

- a. Consider the following page reference string:

a, c, b, a, d, d, e, c, b, a, c, d, e, c, a

Assuming a paging scheme with **FOUR (4)** frames is initially empty. Trace the allocation of pages to frames and determine the number of *page faults* occur using the following page replacement algorithms:

- i. Optimal (4 Marks)
 - ii. Least Recently Used (LRU) (4 Marks)
- b. Explain the steps of page-replacement. (4 Marks)
- c. Define file system. (2 Marks)
- d. Device directory responsible to record information about file. List **TWO (2)** types information it should record. (2 Marks)
- e. Identify **TWO (2)** disadvantages of the following file allocation methods:
- i. contiguous allocation (2 Marks)
 - ii. linked allocation (2 Marks)

End of Page.